

**Review of the Internal Revenue
Service's Year 2000 Efforts to
Inventory Telecommunications and
Commercial Off-the-Shelf Products**

February 1999

Reference Number: 092402



INSPECTOR GENERAL
for TAX
ADMINISTRATION

DEPARTMENT OF THE TREASURY
WASHINGTON, D.C. 20220

February 10, 1999

MEMORANDUM FOR COMMISSIONER ROSSOTTI

FROM: Lawrence W. Rogers /s/Lawrence W. Rogers
Acting Treasury Inspector General for Tax Administration

SUBJECT: Review of the Internal Revenue Service's Year 2000
Efforts to Inventory Telecommunications and Commercial
Off-the-Shelf Products

This report presents the results of our initial assessment of the Internal Revenue Service's (IRS) Year 2000 (Y2K) efforts to inventory telecommunications and commercial off-the-shelf products. Technical expertise for this review was acquired under contract from PricewaterhouseCoopers.

The IRS had significant work to accomplish in order to complete the telecommunications inventory. At the time we issued a draft of this report, IRS management had initiated several actions to complete and correct the telecommunications inventory. Accordingly, we did not make any recommendations on this issue in our report. We are presently conducting a review to assess the adequacy of management's actions in the telecommunications area.

Our audit work also identified a need for the IRS to improve its guidance on how these products are to be reported in the inventory and to re-examine the completeness of its commercial off-the-shelf product inventory. The Director, Office of Information Resources Management agreed with the facts and is taking appropriate actions. Management will issue updated guidelines on how products should be defined and will task a contractor to verify that the inventory of commercial off-the-shelf products is complete for all Tier I systems. Management's response to the findings has been incorporated into the report where appropriate. In addition, the complete text of IRS management's response is presented as an attachment to this report.

Copies of this report are also being sent to IRS managers who are affected by the report recommendations. Please call me at (202) 622-6500 if you have any questions, or your staff may contact Maurice S. Moody, Acting Assistant Inspector General for Audit at (202) 622-8500.

**Review of the Internal Revenue Service's Year 2000 Efforts to Inventory
Telecommunications and Commercial Off-the-Shelf Products**

Table of Contents

Executive Summary	Page i
Objective and Scope	Page 1
Background	Page 1
Results	Page 2
A significant amount of telecommunications equipment sampled from the floor of IRS sites could not be located on the corresponding inventories	Page 2
Improvements are still needed in the inventory of COTS products on the Masterfile system.....	Page 4
Detailed Objectives, Scope and Methodology.....	Attachment I
Major Contributors to this Report	Attachment II
Management Response to Draft Report – Review of Year 2000 Efforts to Inventory Telecommunications and Commercial Off-the-Shelf Products.....	Attachment III
Masterfile COTS Products Absent From INOMS.....	Attachment IV
Report Distribution List.....	Attachment V

Review of the Internal Revenue Service's Year 2000 Efforts to Inventory Telecommunications and Commercial Off-the-Shelf Products

Executive Summary

In preparation for the Year 2000 (Y2K), the Century Date Change (CDC) Project Office has determined that the Internal Revenue Service (IRS) must identify all telecommunications equipment and commercial off-the-shelf (COTS) products and determine whether they will operate correctly or need to be upgraded or replaced.

The overall objective of this review was to provide a preliminary assessment of the IRS' Y2K efforts in these two areas. Technical expertise for this review was acquired under contract from PricewaterhouseCoopers (formerly Coopers & Lybrand).

Results

Our review showed that the IRS still has significant work to accomplish in order to complete the telecommunications inventory. We also identified the need for the IRS to re-examine the completeness of its COTS product inventory.

A significant amount of telecommunications equipment sampled from the floor of IRS sites could not be located on the corresponding inventories.

In performing on-site tests of the telecommunications inventory at the Tennessee Computing Center (TCC) and the Cleveland Customer Service Site, we selected telecommunications equipment from the computer rooms and compared the items with the IRS' inventories of telecommunications equipment. Of the equipment we sampled from the floor, a significant amount could not be found on inventories maintained by the IRS. At TCC, only 4 of 27 items could be found on the Integrated Network and Operations Management System (INOMS). At Cleveland, only 6 of 55 items could be found on the more comprehensive consolidated inventory.

This omission of items from the inventory will hamper the IRS' efforts to furnish a telecommunications environment that will operate without problems in the Year 2000. Because IRS management has initiated several extensive actions to complete and correct the telecommunications inventory, we are not making any recommendations on this issue at this time. We are assessing the adequacy of management's actions to correct the identified problems as part of another ongoing review.

Review of the Internal Revenue Service's Year 2000 Efforts to Inventory Telecommunications and Commercial Off-the-Shelf Products

Improvements are still needed in the inventory of COTS products on the Masterfile system.

Our work on the COTS inventory was limited to the Masterfile system at the Martinsburg Computing Center (MCC). We used automated tools to identify COTS products, which resided on this system, and compared these products with the inventory provided by the INOMS.

We were unable to locate seven Masterfile COTS products on the INOMS inventory. In addition, we identified 24 products, which are not used, but still exist on the system in some form. This condition at MCC may indicate that the inventory of COTS products on other systems could be understated, jeopardizing the IRS' efforts to identify all products needing to be upgraded or replaced before the Year 2000.

Summary of Recommendations

To minimize the risks associated with inaccurate or incomplete inventories, we recommended that the CDC Project Office management:

- Provide guidance instructing system owners to remove all unused COTS software products.
- Provide guidance regarding the level at which COTS products should be reported on INOMS.
- Independently verify that the INOMS inventory of COTS products is complete for all Tier I systems.

Management Response: IRS management agreed with the facts cited in the report and is taking the appropriate corrective actions. Management will distribute a memorandum emphasizing the removal of all unused products by January 31, 1999. In addition, management will issue updated guidelines on how products should be defined and identified, and will distribute a memorandum emphasizing the importance of adhering to the issued guidelines. The CDC Project Office will task a contractor to verify that the INOMS inventory of COTS products is complete for all Tier I systems. Management's comments are included in the body of this report where appropriate and a complete text appears as Attachment III.

Review of the Internal Revenue Service's Year 2000 Efforts to Inventory Telecommunications and Commercial Off-the-Shelf Products

Objective and Scope

The overall objective of this review was to provide a preliminary assessment of the IRS' Year 2000 efforts in the telecommunications and COTS product areas.

The overall objective of this review was to provide a preliminary assessment of the adequacy of the IRS' efforts in two areas: (1) the inventory of telecommunications equipment and (2) the inventory of system software and commercial off-the-shelf (COTS) products. The scope of this work was limited to a preliminary assessment of the adequacy of these inventories. Two sites were examined for telecommunications equipment, the Tennessee Computing Center (TCC) and the Cleveland Customer Service Site. We further examined the Tier I Masterfile system at the Martinsburg Computing Center (MCC) for system software and COTS products.

The review was conducted in accordance with generally accepted government auditing standards. Attachment I contains the detailed objectives, scope and methodology for the review. Management's response to a draft of this report is included as Attachment III.

The list of major contributors to this report is presented in Attachment II.

Background

The IRS has undertaken a major effort to inventory and convert, upgrade or replace all computer-related equipment and software so that all automated data processing functions continue uninterrupted into the Year 2000 (Y2K). To control this effort, the IRS established the Century Date Change (CDC) Project Office. The CDC Project Office is responsible for the oversight of all Y2K-related efforts. Among these are the efforts to catalog and convert all telecommunications equipment and all COTS products.

The CDC Project Office has determined that the IRS will identify all telecommunications equipment and

Review of the Internal Revenue Service's Year 2000 Efforts to Inventory Telecommunications and Commercial Off-the-Shelf Products

ensure that equipment will either operate in a Y2K environment or that it will be upgraded or replaced. The CDC Project Office has established similar goals for the IRS' inventory of system software and COTS products. We initiated this review to assess the progress in the telecommunications and system software/COTS areas.

Technical expertise for this review was acquired under contract from PricewaterhouseCoopers (formerly Coopers & Lybrand). The vendor completed the majority of the work on this review with oversight from our office.

Results

The IRS still has significant work to accomplish to complete the telecommunications inventory. We also identified the need for IRS to re-examine the completeness of its COTS inventory.

A significant amount of telecommunications equipment sampled from the floor of IRS sites could not be located on the corresponding inventories

At the Tennessee Computing Center, only 4 of 27 pieces of telecommunications equipment sampled could be found on the INOMS inventory.

Our work in this area was performed at two sites, the Tennessee Computing Center (TCC) and the Cleveland Customer Service Site. Our visit to TCC occurred after the initial site survey by the Telecommunications Project Office, but before the 100 percent site survey that was conducted in June 1998. At both sites a significant amount of the equipment on the floor could not be located on inventories used by the IRS and the Telecommunications Project Office to control the Y2K effort. We concluded that a significant amount of work remains to be done to complete the inventory at both of these sites.

At TCC we compared a sample of telecommunications equipment found on-site with the inventory information stored on the Integrated Network and Operations

Review of the Internal Revenue Service's Year 2000 Efforts to Inventory Telecommunications and Commercial Off-the-Shelf Products

Management System (INOMS). We also compared a sample of INOMS telecommunications inventory records to the physical pieces of equipment. For this part of our review, fax machines and modems were not included. Our results were as follows:

- Only 4 of 27 pieces of telecommunications equipment were found on the INOMS inventory.
- Eighteen of 19 records sampled from the INOMS inventory were supported by actual pieces of equipment.

At the Cleveland Customer Service Site, only 6 of 55 pieces of telecommunications equipment could be found on the Consolidated Inventory.

At the Cleveland Customer Service Site, we compared a sample of telecommunications equipment found on-site with inventory information from the Consolidated Inventory. The Consolidated Inventory is a collection of inventory data from numerous sources including INOMS and the Treasury Communications System (TCS). Only 6 of 55 items selected could be found on the Consolidated Inventory.

Without a complete and accurate telecommunications inventory, the IRS faces the risk that parts of its networks will fail after January 1, 2000, because of unidentified equipment that needs replacing or upgrading. Our audit work sought to gauge the magnitude of the tasks that the IRS will face in making its telecommunications environment Y2K compliant after it has completed its inventory. From a sample of 44 items:

- We were able to find Y2K information readily available on a vendor web site for 21 items (48 percent). Of these, 43 percent (9 of the 21) of the item types were found to have Y2K issues.
- We were unable to locate information for the other 23 items because (1) the vendor could not be found on the Web, (2) the vendor web site did not contain Y2K information, or (3) no match was found for the model in the IRS database.

Review of the Internal Revenue Service's Year 2000 Efforts to Inventory Telecommunications and Commercial Off-the-Shelf Products

As of September 9, 1998, plans were in place to verify the inventory of telecommunications equipment at all 805 IRS sites.

This information suggests that the IRS will have a relatively short time frame to assess, test and replace a significant number of telecommunications equipment items.

Although we performed limited audit work at two sites, we believe the significant understatement in inventory at these two sites warrants further work by management. When we met with the Acting National Director, Telecommunications and Operations Division, in June 1998 to discuss these issues, he agreed that more work needed to be done to produce an accurate inventory. Site surveys, during which all telecommunication equipment was inventoried, have been completed at all computing and service centers. As of September 9, 1998, plans were in place to perform a complete telecommunications inventory at each of the 805 IRS sites. In addition, the IRS' Executive Steering Committee receives a regular report on the status of these activities. Because of the recent management initiatives to correct these problems, we are making no recommendations at this time. We are currently conducting another review in which we will further assess the adequacy of management's actions.

Improvements are still needed in the inventory of COTS products on the Masterfile system

As part of the IRS' Y2K efforts, organizations were asked to certify their inventories of COTS products as shown on the INOMS inventory. To initially gauge the effectiveness of this effort, we reviewed the Masterfile system at the MCC. We identified COTS products resident on the Masterfile system from three sources by:

- running "CA-Examine" against the system,
- examining output from the "SoftAudit" product, and
- interviewing Systems Programming Branch personnel.

"CA-Examine" was used to identify key operating system libraries that could include clues to the existence

Review of the Internal Revenue Service's Year 2000 Efforts to Inventory Telecommunications and Commercial Off-the-Shelf Products

Seven COTS products on the Masterfile system were not recorded on the INOMS inventory database.

of COTS products. "SoftAudit" analyzes the system's library structure and compares this with an internal knowledge base to identify COTS products.

The initial results of this work showed that 255 COTS products on the Masterfile system were not reflected on the INOMS inventory. After we provided a memorandum to MCC management with a listing of the 255 COTS products, we worked with their staff to identify 7 products that could not be accounted for on INOMS. These seven products are shown in Attachment IV.

Management provided various reasons why most of the products could not be located on INOMS, including:

- The IRS does not use 24 products because they no longer reside on the Masterfile system or are not licensed for use by the IRS. For example, two of the products belong to the General Accounting Office and are only loaded on the system when an audit is being conducted. There is currently no requirement that stipulates that COTS products used by the IRS be removed from the system.
- Many of the products were shipped as part of the operating system or some other product family and are not listed separately on INOMS.

Inconsistent reporting on INOMS makes it difficult for management to accurately track Y2K efforts.

For software products that are bundled under some broader product category, it is not currently possible to ensure that they have been treated consistently throughout the IRS. For example, some of the products reported by MCC on INOMS as being integral parts of another product were reported separately on INOMS for other systems. This inconsistency makes it difficult for management to accurately track Y2K progress for COTS products.

Despite several efforts to complete the COTS inventory at MCC, problems continue to persist.

Also, since MCC has already undertaken several efforts to complete its COTS inventory, the problems cited in this report raise serious concerns about the IRS' ability to complete the COTS inventory on its major systems. Since a complete inventory is a requirement for the IRS' 14-step process for Y2K conversion, an incomplete

Review of the Internal Revenue Service's Year 2000 Efforts to Inventory Telecommunications and Commercial Off-the-Shelf Products

inventory could have a serious, negative impact on the success of the IRS' efforts to convert COTS products.

Recommendations:

1. The CDC Project Office should provide guidance instructing system owners to remove all unused COTS software products by January 31, 1999.

Management Response: The ADP Property Management Section (IS:O:O:TA) is responsible for providing guidance/direction to system owners (users) on the status of unused ADP property. A memorandum will be distributed by the Deputy Chief Information Officer (Operations) IS, emphasizing the removal of all unused products by January 31, 1999.

2. The CDC Project Office should provide guidance to the field regarding the level at which COTS products should be reported on INOMS. Products should be defined neither too broadly nor too distinctly. In the former case, products may be overlooked for conversion. In the latter case, status reports will show more progress than has actually occurred.

Management Response: The ADP Property Management Section has reviewed existing guidelines and will issue updated guidelines on how products should be defined and identified. A memorandum will be distributed by the Deputy Chief Information Officer (Operations) IS, emphasizing the adherence to the issued guidelines.

3. The CDC Project Office should independently verify that the INOMS inventory of COTS products is complete for all Tier I systems. This verification could be accomplished by sampling COTS products present on several machines and comparing them to the INOMS inventory.

Management Response: The IRS already has procedures to ensure the accuracy and integrity of the INOMS inventory. Responsibility for administration of this program belongs to the

Review of the Internal Revenue Service's Year 2000 Efforts to Inventory Telecommunications and Commercial Off-the-Shelf Products

Director, Telecommunications and Operations Division. Responsibility for following the procedures promulgated by the Director, Telecommunications and Operations Division, falls to site executives identified in the INOMS inventory.

As an additional measure, the CDC Project Office will task the contractor to verify that the INOMS inventory of COTS products is complete for all Tier I systems. The ADP Property Management Section will assist the CDC Program Office with this verification effort. They will continue to work very closely to provide consistent direction to system users and to ensure that recorded data for all tiers and categories is correct on INOMS.

**Review of the Internal Revenue Service's Year 2000 Efforts to Inventory
Telecommunications and Commercial Off-the-Shelf Products**

Attachment I

Detailed Objectives, Scope and Methodology

The overall objective of this review was to provide a preliminary assessment of the IRS' Year 2000 (Y2K) efforts in completing a Y2K inventory of its COTS products and system software, and of its telecommunications equipment. Specifically, we:

- I. Contracted with PricewaterhouseCoopers (formerly Coopers & Lybrand) to provide technical assistance in performing the audit work.
- II. Assessed the IRS' Y2K inventory of COTS products and system software by:
 - A. Making a preliminary assessment of whether all COTS products and system software have been captured on the INOMS inventory system for the Masterfile system at the Martinsburg Computing Center.
 - B. Providing a rough order of magnitude estimate of the work required to fully assess the accuracy and completeness of the COTS and system software inventory for the Masterfile system.
- III. Assessed the IRS' efforts to ensure that its telecommunications environment will operate appropriately in the Year 2000 by:
 - A. Providing a preliminary assessment of the completeness and accuracy of the inventory of telecommunications equipment at the Tennessee Computing Center.
 - B. Providing a rough order of magnitude estimate of the amount of equipment from the IRS' inventory of telecommunications equipment that could experience Y2K related problems.
 - C. Providing a preliminary assessment of the completeness and accuracy of the consolidated inventory of telecommunications equipment at the Cleveland Customer Service Site.

**Review of the Internal Revenue Service's Year 2000 Efforts to Inventory
Telecommunications and Commercial Off-the-Shelf Products**

Attachment II

Major Contributors to this Report

Michael Phillips, Acting Director, Office of Audit Projects

Vincent Dell'Orto, Audit Manager

Scott Rehrig, Senior Auditor

PricewaterhouseCoopers

**Review of the Internal Revenue Service's Year 2000 Efforts to Inventory
Telecommunications and Commercial Off-the-Shelf Products**


Attachment III



DEPARTMENT OF THE TREASURY
INTERNAL REVENUE SERVICE
WASHINGTON, D.C. 20224

DEC 22 1999

MEMORANDUM FOR CHIEF INSPECTOR

FROM: David W. Jupkins 
Director, Office of Information Resources Management IS:IR

SUBJECT: Response to Draft Internal Audit Report- Review of Year 2000
Efforts to Inventory Telecommunications and
Commercial Off-the-Shelf Products

The Director, Year 2000 Program, and the Assistant Commissioner for National Operations, have reviewed the subject draft Internal Audit Report and provide the attached management response.

If you have any questions, please call me on (202) 283-4060, or have a member of your staff call Donna Downing on (202) 283-4159.

Attachment

cc: Assistant Chief Inspector (Internal Audit)
Deputy Director, Office of Audit Projects

Review of the Internal Revenue Service's Year 2000 Efforts to Inventory Telecommunications and Commercial Off-the-Shelf Products

Response to Draft Internal Audit Report- Review of Year 2000 Efforts to Inventory Telecommunications and Commercial Off-the-Shelf Products

Recommendation #1

The Century Date Change Project Office should provide guidance instructing system owners to remove all unused COTS software products by January 31, 1999.

Assessment of Cause

Four COTS products used at the Martinsburg Computing Center (MCC), C/C++ for MVS/ESA, CA-90s, CA-Extend/DASD and Compuware Shared Services, do not have a corresponding entry on the INOMS' Standard Product Table. Changes to the table are ongoing, and once completed, product information will be entered.

The remaining three products are listed on INOMS accordingly: CA-Phoenix is listed as VS/SP/XA/W/Phoenix Course; CA-Remote Console/MVS is part of Auto Remote Operations; and IOA is listed with all fields complete. The audit review discovered the 24 products listed on INOMS but not used at MCC. We request a copy of the list of 24 products.

Corrective Action #1

The ADP Property Management Section, IS:O:O:TA, is responsible for providing guidance/direction to system owners (users) on the status of unused ADP property. A memorandum will be distributed by the Deputy Chief Information Officer (Operations) IS, emphasizing the removal of all unused products by January 31, 1999.

Implementation Date for Corrective Action #1

Completed: _____

Proposed: 02-01-99
Removal of all unused products

Responsible Official for Corrective Action #1

Chief Information Officer IS
Deputy Chief Information Officer (Operations) IS
Assistant Commissioner for National Operations IS:O
Director, Telecommunications and Operations IS:O:O

Review of the Internal Revenue Service's Year 2000 Efforts to Inventory Telecommunications and Commercial Off-the-Shelf Products

Response to Draft Internal Audit Report- Review of Year 2000 Efforts to Inventory Telecommunications and Commercial Off-the-Shelf Products

Recommendation #2

The Century Date Change Project Office should provide guidance to the field regarding the level at which COTS products should be reported on INOMS. Products should be defined neither too broadly nor too distinctly. In the former case, products may be overlooked for conversion. In the latter case, status reports will show more progress than has actually occurred.

Assessment of Cause

Four COTS products used at the Martinsburg Computing Center (MCC), C/C++ for MVS/ESA, CA-90s, CA-Extend/DASD and Compuware Shared Services, do not have a corresponding entry on the INOMS' Standard Product Table. Changes to the table are ongoing, and once completed, product information will be entered.

The remaining three products are listed on INOMS accordingly: CA-Phoenix is listed as VS/SP/XA/W/Phoenix Course; CA-Remote Console/MVS is part of Auto Remote Operations; and IOA is listed with all fields complete. The audit review discovered the 24 products listed on INOMS but not used at MCC. We request a copy of the list of 24 products.

Corrective Action #2

The ADP Property Management Section has reviewed existing guidelines and will issue updated guidelines on how products should be defined and identified. A memorandum will be distributed by the Deputy Chief Information Officer (Operations) IS, emphasizing the adherence to the issued guidelines.

Implementation Date for Corrective Action #2

Completed: _____

Proposed: 02-01-99

Responsible Official for Corrective Action #2

Chief Information Officer IS
Deputy Chief Information Officer (Operations) IS
Assistant Commissioner for National Operations IS:O
Director, Telecommunications and Operations IS:O:O

Review of the Internal Revenue Service's Year 2000 Efforts to Inventory Telecommunications and Commercial Off-the-Shelf Products

Response to Draft Internal Audit Report - Review of Year 2000 Efforts to Inventory Telecommunications and Commercial Off-the-Shelf Products

Recommendation #3

The Century Date Change Project Office should independently verify that the INOMS inventory of COTS products is complete for all Tier I systems. This verification could be accomplished by sampling COTS products present on several machines and comparing them to the INOMS inventory.

Assessment of Cause

Four COTS products used at the Martinsburg Computing Center (MCC), C/C++ for MVS/ESA, CA-90s, CA-Extend/DASD and Compuware Shared Services, do not have a corresponding entry on the INOMS' Standard Product Table. Changes to the table are ongoing, and once completed, product information will be entered.

The remaining three products are listed on INOMS accordingly: CA-Phoenix is listed as VS/SP/XA/W/Phoenix Course; CA-Remote Console/MVS is part of Auto Remote Operations; and IOA is listed with all fields complete. The audit review discovered the 24 products listed on INOMS but not used at MCC. We request a copy of the list of 24 products.

Corrective Action #3

The IRS already has procedures to insure the accuracy and integrity of the INOMS inventory. Responsibility for administration of this program belongs to Telecommunications and Operations (IS:O:O). Responsibility for following the procedures promulgated by IS:O:O falls to site executives identified in the INOMS inventory.

As an additional measure, the CDC Project Office will task the contractor to verify that the INOMS inventory of COTS products is complete for all Tier I systems. The ADP Property Management Section will assist the CDC Program Office with this verification effort. They will continue to work very closely to provide consistent direction to system users and to ensure that recorded data for all tiers and categories is correct on INOMS.

Over the long term, independent verification is the responsibility of IS:O:O, supported and reviewed by Internal Audit.

Review of the Internal Revenue Service's Year 2000 Efforts to Inventory Telecommunications and Commercial Off-the-Shelf Products

Response to Draft Internal Audit Report- Review of Year 2000 Efforts to Inventory Telecommunications and Commercial Off-the-Shelf Products

Implementation Date for Corrective Action #3

Completed: _____

Proposed: 04-01-99
Independent IV&V of Tier I
COTS Products

Responsible Official for Corrective Action #3

Chief Information Officer IS
Deputy Chief Information Officer (Systems) IS
Director, Century Date Change Project Office IS:CD

**Review of the Internal Revenue Service's Year 2000 Efforts to Inventory
Telecommunications and Commercial Off-the-Shelf Products**

Attachment IV

Masterfile COTS Products Absent From INOMS

The following products are present on the Masterfile System, but have no corresponding record on INOMS.

1. C/C++ for MVS/ESA
2. CA-90s
3. CA-Extend/DASD
4. CA-Phoenix
5. CA-Remote Console/MVS
6. Compuware Shared Services
7. IOA

**Review of the Internal Revenue Service's Year 2000 Efforts to Inventory
Telecommunications and Commercial Off-the-Shelf Products**

Attachment V

Report Distribution List

Deputy Commissioner for Modernization C:DM
Deputy Commissioner for Operations C:DO
Chief Information Officer IS
Deputy Chief Information Officer, Systems IS
Deputy Chief Information Officer, Operations IS
Assistant Commissioner, National Operations IS:O
Assistant Commissioner, Systems Development IS:S
Director, Martinsburg Computing Center IS:O:M
Director, Tennessee Computing Center IS:O:T